

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-045120  
 (43)Date of publication of application : 16.02.1996

(51)Int.Cl. G11B 7/26  
 C25D 1/00

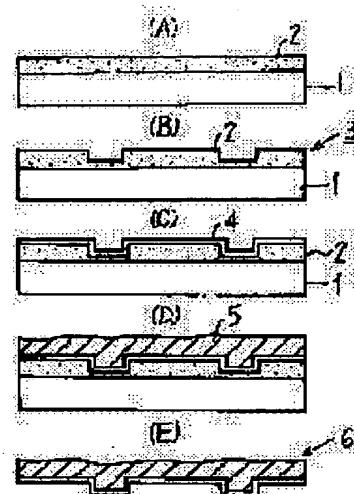
(21)Application number : 07-098977  
 (22)Date of filing : 24.04.1995

(71)Applicant : FUJITSU LTD  
 (72)Inventor : NAKAJIMA MINORU  
 TSUGAWA IWAO  
 ETSUNO NAGAAKI

## (54) PRODUCTION OF DISK

## (57)Abstract:

PURPOSE: To obtain a disk having good information quality by using a stamper of high quality with little defects to produce the disk.  
 CONSTITUTION: A resist film 2 is formed on a substrate 1 by spin coating method. The resist film 2 is exposed to light by selective irradiation with laser light in the pregroove position and the address position such as track numbers and developed to obtain a pregroove master disk 3. Then, a Ni-vapor deposition film 4 of several 100&angst; thickness is formed on the master disk 3 by vacuum vapor deposition method, on which a Ni layer 5 of about 300. m thickness is formed by electroplating method. The Ni layer 5 is peeled from the pregrooved master disk to obtain a stamper 6. This stamper 6 is used as a casting mold to mold a synthetic resin by similar method as the production of music records. Then, a recording medium layer is formed on the obtd. synthetic resin plate. By producing a disk by using the stamper 6 of high quality with little defects, disks having good information quality in which information such as pregrooves and addresses is reproduced with high accuracy can be obtd.



## LEGAL STATUS

[Date of request for examination] 24.04.1995  
 [Date of sending the examiner's decision of rejection] 05.11.1996  
 [Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]  
 [Date of final disposal for application]  
 [Patent number] 2663912  
 [Date of registration] 20.06.1997  
 [Number of appeal against examiner's decision of rejection] 08-20428  
 [Date of requesting appeal against examiner's decision of rejection] 05.12.1996  
 [Date of extinction of right]

\* NOTICES \*

Japan Patent Office is not responsible for any  
damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

CLAIMS

---

(57) [Claim(s)]

1. manufacture method of disk characterize by to form nickel vacuum evaporationo film on original recording of disk of heating condition , to perform electroplating of nickel , to use as mold La Stampa created by exfoliate from said original recording after perform pretreatment which it be immerse [ pretreatment ] in nickel plating liquid and make it rotate said original recording so that water repellence of said original recording may be remove , to cast by resin , and to manufacture said disk .

2. Said disk is the manufacture method of a disk according to claim 1 characterized by being an optical disk.

---

[Translation done.]

## \* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

## DETAILED DESCRIPTION

---

### [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the manufacture method of disks, such as an optical disk.

[0002]

[Description of the Prior Art] An optical disk is the memory equipped with the features -- mass information record is possible, and informational record and playback can be performed in a disk side and the non-contact condition, and it is hard to be influenced of dust. That is, in a magnetic disk or a magnetic tape, since it records by condensing a laser beam at a minute spot with a diameter of 1 micrometer to 1-bit information record taking the area of several 10 square mum in the case of an optical disk, a 1 square mum grade will be sufficient for record area, and the mass record of it is attained.

[0003] Moreover, the distance from the lens end face of the laser beam narrowed down with an objective lens to a disk side can avoid 1 thru/or the danger of a head crash which poses a problem with a magnetic disk since there is 2mm, therefore the reinforcement of it becomes possible. Since the spot whose diameter is about 1 micrometer is also the light beam whose diameter is about 1 micrometer on transparence covering, existence of dust stops moreover, as for the laser beam for record playback, almost doing effect, while a record medium is not exposed, therefore contamination is avoided, since thickness is narrowed down through transparent covering it is [ covering ] about 1mm.

[0004]

[Problem(s) to be Solved by the Invention] Drawing 1 shows the manufacturing process of La Stampa for optical disks. That is, the glass disk whose diameters are 20 thru/or 40cm is used as a substrate by about 5mm, and as shown in this drawing (A), on this substrate 1, the thickness ground well uses a spin coat method, and forms the resist film 2.

[0005] next, a laser beam -- PURIGURUBU location and truck NO. etc. -- carry out selective irradiation to the address position, the resist film 2 is made to expose, and the PURIGURUBU original recording 3 as shown in this drawing (B) is done by developing this. next, this drawing (C) -- being shown -- like -- a vacuum deposition method -- the PURIGURUBU original recording 3 top -- the number of thickness -- 100A (Nickel nickel) vacuum evaporationo film 4 is made, and this drawing (D) shows on this vacuum evaporationo film 4 further -- as -- electrolysis plating (it omits below and plates) -- the nickel layer 5 with a thickness of about 300 micrometers is formed by law.

[0006] Thus, La Stampa 6 as shows the made nickel layer 5 in this drawing (E) by exfoliating from the PURIGURUBU original recording 3 shown in this drawing (B) is completed. And La Stampa 6 made by doing in this way makes this mold, synthetic resin is cast by the method similar to record manufacture, and the optical disk is made by forming a record-medium layer on this synthetic-resin board.

[0007] As the requirement of La Stampa 6 is shown in this drawing (B) here, while the information on PURIGURUBU currently formed in the resist film 2, the address, etc. is reproduced by high degree of accuracy, it is flat, the location, for example, the PURIGURUBU location, where informational writing will be performed from now on, and it requires that there should be no defect. If irregularity exists in a record-medium side, while a laser beam will reflect irregularly in a readout and a noise will increase, as for the reason, information quality is spoiled remarkably.

[0008] Then, a glass substrate 1 uses what was ground flat and smooth. And nickel vacuum evaporationo film 4 is formed on the resist film 2 shown in this drawing (C). Furthermore, in order to raise more the adhesion of the resist film 2 and nickel vacuum evaporationo film 4, heating a substrate 1 is performed. However, by performing nickel vacuum evaporationo on the resist film 2, or performing the above-mentioned substrate heating, a volatile component

occurs from the resist film 2, it mixes into nickel vacuum evaporationo film 4, or it results that the resist film 2 and nickel vacuum evaporationo film 4 cause a certain reaction etc., and nickel vacuum evaporationo film is tinctured with water repellence. Therefore, in the following nickel plating production process, the adhesion of the nickel layer 5 and nickel vacuum evaporationo film 4 becomes imperfect. Therefore, there is a problem more than which some nickel vacuum evaporationo films 4 remain on the resist film 2 in exfoliating the nickel layer 5 from PURIGURUBU original recording for formation of La Stampa 6, therefore the number of defects of La Stampa 6 increases.

[0009] After forming nickel vacuum evaporationo film 4 as this solution, it was possible to wash a film surface using a solvent, but since a resist dissolved easily to a common solvent thinly [ the thickness of nickel vacuum evaporationo film 4 ], there was a problem referred to as being unable to perform surface treatment, such as washing. This invention aims at offering the manufacture method of the good disk of information quality using good La Stampa with few defects.

[0010]

[Means for Solving the Problem] this invention be characterize by to perform electroplating of nickel , to form a nickel vacuum evaporationo film on original recording of a disk of a heating condition in a manufacture method of a disk , to use as mold La Stampa created by exfoliate from said original recording , to cast by resin , after perform pretreatment which it be immerse [ pretreatment ] in nickel plating liquid and make it rotate said original recording so that the water repellence of said original recording may be remove , and to manufacture said disk . Moreover, it is characterized by said disk being an optical disk.

[0011]

[Function] The good disk of information quality can be created by this invention forming a nickel vacuum evaporationo film on the original recording of a disk, performing after slack pretreatment which it is immersed [ pretreatment ] in nickel plating liquid and makes it rotate said original recording, it performing electroplating of nickel, after it removes the water repellence of a nickel vacuum evaporationo film, exfoliating from original recording, creating La Stampa with few defects, and creating a disk by using the La Stampa as mold.

[0012]

[Example] If in charge of manufacture of La Stampa 6, the defect in a shaping side needs to lessen as much as possible. However, performing nickel vacuum evaporationo, causing a certain reaction by performing substrate heating, etc. may result from the resist film 2, and big water repellence may arise on nickel vacuum evaporationo film. [0013] The PURIGURUBU original recording (omitting below vacuum evaporationo substrate) in which nickel vacuum evaporationo film 4 shown in drawing 1 (C) as a method of removing water repellence was formed was immersed into nickel plating liquid, without an artificer etc. performing solvent processing, and it found out that water repellence was removable by performing rotation processing. However, this water-repellent removal is not essential, and if desiccation processing is performed after performing water washing, the original water repellence will appear again. Although this reason is not clear, probably the surfactant therefore added in plating liquid at the potential difference of nickel vacuum evaporationo liquid and plating liquid and the stirring effect by rotation is considered to deposit on the surface of a vacuum evaporationo substrate and to vanish water repellence.

[0014] In case the adhesion of a vacuum evaporationo substrate and nickel deposit improves, the nickel layer 5 shown by drawing 1 (D) is exfoliated and La Stampa 6 is made by this method, the defect by survival of nickel vacuum evaporationo film 4 can be abolished. The creation method of a disk is explained below. Substrate heating temperature at the time of forming nickel vacuum evaporationo film in PURIGURUBU original recording was made into 140 degrees C, it vapor-deposited on this condition, and nickel vacuum evaporationo film with a thickness of 500A was formed.

[0015] Although it was immersed in the nickel-plating liquid of marketing which makes nickel amiosulfonate the main constituent, this vacuum evaporationo substrate was rotated as \*\* at the rotational frequency of 100RPM in 40 minutes, it plated with the after that usual method and La Stampa was made, defect density is about ten and whether you are Haruka has it compared with the former. [ little ] And La Stampa with few [ in this way ] defects is used as mold, synthetic resin is cast by the method similar to record manufacture, and an optical disk is created by forming a record-medium layer on this synthetic-resin board.

[0016] Drawing 2 shows the relation between the defect density of La Stampa, and immersion time amount, and the number of defects was measured from the abnormalities of the reflected light, when the surface of La Stampa was scanned at a laser spot. Although rotation of a vacuum evaporationo substrate is 100RPM here, defect density decreases

with immersion time amount, and approaches constant value so that more clearly than a characteristic curve 7. In addition, defect density carries out [ no ] counting of the defects produced on the La Stampa surface here, and the exfoliation defect of nickel vacuum evaporationo film is found in the saturation value of a characteristic curve 7. [0017] The defect of La Stampa can be reduced by performing easy processing referred to as rotating a vacuum evaporationo substrate in liquid as mentioned above. In addition, as shown by the characteristic curve 7 of drawing 2 , also in slight immersion time amount, the defect density of La Stampa decreases sharply and reaches near the saturation value immediately. And defect density has reached the saturation value in about 60 minutes. Since La Stampa is the original recording for manufacturing a disk, as for rotation in the liquid of a vacuum evaporationo substrate, it is desirable to carry out until reduction of the number of the defect density of a characteristic curve 7 with which the exfoliation defect of nickel vacuum evaporationo film stops finding reaches a saturation value. [0018] [Effect of the Invention] This invention is manufacturing a disk using good La Stampa with few defects, and the information on PURIGURUBU, the address, etc. is reproduced by high degree of accuracy, and it becomes possible to offer the good disk of information quality.

---

[Translation done.]

\* NOTICES \*

Japan Patent Office is not responsible for any  
damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

TECHNICAL FIELD

---

[Industrial Application] This invention relates to the manufacture method of disks, such as an optical disk.  
[0002]

---

[Translation done.]

**\* NOTICES \***

Japan Patent Office is not responsible for any  
damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**PRIOR ART**

---

[Description of the Prior Art] An optical disk is the memory equipped with the features -- mass information record is possible, and informational record and playback can be performed in a disk side and the non-contact condition, and it is hard to be influenced of dust. That is, in a magnetic disk or a magnetic tape, since it records by condensing a laser beam at a minute spot with a diameter of 1 micrometer to 1-bit information record taking the area of several 10 square mum in the case of an optical disk, a 1 square mum grade will be sufficient for record area, and the mass record of it is attained.

[0003] Moreover, the distance from the lens end face of the laser beam narrowed down with an objective lens to a disk side can avoid 1 thru/or the danger of a head crash which poses a problem with a magnetic disk since there is 2mm, therefore the reinforcement of it becomes possible. Since the spot whose diameter is about 1 micrometer is also the light beam whose diameter is about 1 micrometer on transparency covering, existence of dust stops moreover, as for the laser beam for record playback, almost doing effect, while a record medium is not exposed, therefore contamination is avoided, since thickness is narrowed down through transparent covering it is [ covering ] about 1mm.

---

[Translation done.]

\* NOTICES \*

Japan Patent Office is not responsible for any  
damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

EFFECT OF THE INVENTION

---

[Effect of the Invention] This invention is manufacturing a disk using good La Stampa with few defects, and the information on PURIGURUBU, the address, etc. is reproduced by high degree of accuracy, and it becomes possible to offer the good disk of information quality.

---

[Translation done.]

## \* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

## TECHNICAL PROBLEM

---

[Problem(s) to be Solved by the Invention] Drawing 1 shows the manufacturing process of La Stamp for optical disks. That is, the glass disk whose diameters are 20 thru/or 40cm is used as a substrate by about 5mm, and as shown in this drawing (A), on this substrate 1, the thickness ground well uses a spin coat method, and forms the resist film 2.

[0005] next, a laser beam -- PURIGURUBU location and truck NO. etc. -- carry out selective irradiation to the address position, the resist film 2 is made to expose, and the PURIGURUBU original recording 3 as shown in this drawing (B) is done by developing this. next, this drawing (C) -- being shown -- like -- a vacuum deposition method -- the PURIGURUBU original recording 3 top -- the number of thickness -- 100A (Nickel nickel) vacuum evaporationo film 4 is made, and this drawing (D) shows on this vacuum evaporationo film 4 further -- as -- electrolysis plating (it omits below and plates) -- the nickel layer 5 with a thickness of about 300 micrometers is formed by law.

[0006] Thus, La Stamp 6 as shows the made nickel layer 5 in this drawing (E) by exfoliating from the PURIGURUBU original recording 3 shown in this drawing (B) is completed. And La Stamp 6 made by doing in this way makes this mold, synthetic resin is cast by the method similar to record manufacture, and the optical disk is made by forming a record-medium layer on this synthetic-resin board.

[0007] As the requirement of La Stamp 6 is shown in this drawing (B) here, while the information on PURIGURUBU currently formed in the resist film 2, the address, etc. is reproduced by high degree of accuracy, it is flat, the location, for example, the PURIGURUBU location, where informational writing will be performed from now on, and it requires that there should be no defect. If irregularity exists in a record-medium side, while a laser beam will reflect irregularly in a readout and a noise will increase, as for the reason, information quality is spoiled remarkably.

[0008] Then, a glass substrate 1 uses what was ground flat and smooth. And nickel vacuum evaporationo film 4 is formed on the resist film 2 shown in this drawing (C). Furthermore, in order to raise more the adhesion of the resist film 2 and nickel vacuum evaporationo film 4, heating a substrate 1 is performed. However, by performing nickel vacuum evaporationo on the resist film 2, or performing the above-mentioned substrate heating, a volatile component occurs from the resist film 2, it mixes into nickel vacuum evaporationo film 4, or it results that the resist film 2 and nickel vacuum evaporationo film 4 cause a certain reaction etc., and nickel vacuum evaporationo film is tinctured with water repellence. Therefore, in the following nickel plating production process, the adhesion of the nickel layer 5 and nickel vacuum evaporationo film 4 becomes imperfect. Therefore, there is a problem more than which some nickel vacuum evaporationo films 4 remain on the resist film 2 in exfoliating the nickel layer 5 from PURIGURUBU original recording for formation of La Stamp 6, therefore the number of defects of La Stamp 6 increases.

[0009] After forming nickel vacuum evaporationo film 4 as this solution, it was possible to wash a film surface using a solvent, but since a resist dissolved easily to a common solvent thinly [ the thickness of nickel vacuum evaporationo film 4 ], there was a problem referred to as being unable to perform surface treatment, such as washing. This invention aims at offering the manufacture method of the good disk of information quality using good La Stamp with few defects.

---

[Translation done.]

\* NOTICES \*

Japan Patent Office is not responsible for any  
damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

MEANS

---

[Means for Solving the Problem] this invention be characterize by to perform electroplating of nickel , to form a nickel vacuum evaporationo film on original recording of a disk of a heating condition in a manufacture method of a disk , to use as mold La Stamp a created by exfoliate from said original recording , to cast by resin , after perform pretreatment which it be immerse [ pretreatment ] in nickel plating liquid and make it rotate said original recording so that the water repellence of said original recording may be remove , and to manufacture said disk . Moreover, it is characterized by said disk being an optical disk.

---

[Translation done.]

\* NOTICES \*

Japan Patent Office is not responsible for any  
damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

OPERATION

---

[Function] The good disk of information quality can be created by this invention forming a nickel vacuum evaporationo film on the original recording of a disk, performing after slack pretreatment which it is immersed [ pretreatment ] in nickel plating liquid and makes it rotate said original recording, it performing electroplating of nickel, after it removes the water repellence of a nickel vacuum evaporationo film, exfoliating from original recording, creating La Stampa with few defects, and creating a disk by using the La Stampa as mold.

---

[Translation done.]

## \* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## EXAMPLE

[Example] If in charge of manufacture of La Stamp 6, the defect in a shaping side needs to lessen as much as possible. However, performing nickel vacuum evaporationo, causing a certain reaction by performing substrate heating, etc. may result from the resist film 2, and big water repellence may arise on nickel vacuum evaporationo film. [0013] The PURIGURUBU original recording (omitting below vacuum evaporationo substrate) in which nickel vacuum evaporationo film 4 shown in drawing 1 (C) as a method of removing water repellence was formed was immersed into nickel plating liquid, without an artificer etc. performing solvent processing, and it found out that water repellence was removable by performing rotation processing. However, this water-repellent removal is not essential, and if desiccation processing is performed after performing water washing, the original water repellence will appear again. Although this reason is not clear, probably the surfactant therefore added in plating liquid at the potential difference of nickel vacuum evaporationo liquid and plating liquid and the stirring effect by rotation is considered to deposit on the surface of a vacuum evaporationo substrate and to vanish water repellence.

[0014] In case the adhesion of a vacuum evaporationo substrate and nickel deposit improves, the nickel layer 5 shown by drawing 1 (D) is exfoliated and La Stamp 6 is made by this method, the defect by survival of nickel vacuum evaporationo film 4 can be abolished. The creation method of a disk is explained below. Substrate heating temperature at the time of forming nickel vacuum evaporationo film in PURIGURUBU original recording was made into 140 degrees C, it vapor-deposited on this condition, and nickel vacuum evaporationo film with a thickness of 500A was formed.

[0015] Although it was immersed in the nickel-plating liquid of marketing which makes nickel amiosulfonate the main constituent, this vacuum evaporationo substrate was rotated as \*\* at the rotational frequency of 100RPM in 40 minutes, it plated with the after that usual method and La Stamp was made, defect density is about ten and whether you are Haruka has it compared with the former. [ little ] And La Stamp with few [ in this way ] defects is used as mold, synthetic resin is cast by the method similar to record manufacture, and an optical disk is created by forming a record-medium layer on this synthetic-resin board.

[0016] Drawing 2 shows the relation between the defect density of La Stamp, and immersion time amount, and the number of defects was measured from the abnormalities of the reflected light, when the surface of La Stamp was scanned at a laser spot. Although rotation of a vacuum evaporationo substrate is 100RPM here, defect density decreases with immersion time amount, and approaches constant value so that more clearly than a characteristic curve 7. In addition, defect density carries out [ no ] counting of the defects produced on the La Stamp surface here, and the exfoliation defect of nickel vacuum evaporationo film is found in the saturation value of a characteristic curve 7.

[0017] The defect of La Stamp can be reduced by performing easy processing referred to as rotating a vacuum evaporationo substrate in liquid as mentioned above. In addition, as shown by the characteristic curve 7 of drawing 2, also in slight immersion time amount, the defect density of La Stamp decreases sharply and reaches near the saturation value immediately. And defect density has reached the saturation value in about 60 minutes. Since La Stamp is the original recording for manufacturing a disk, as for rotation in the liquid of a vacuum evaporationo substrate, it is desirable to carry out until reduction of the number of the defect density of a characteristic curve 7 with which the exfoliation defect of nickel vacuum evaporationo film stops finding reaches a saturation value.

[Translation done.]

\* NOTICES \*

Japan Patent Office is not responsible for any  
damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

DESCRIPTION OF DRAWINGS

---

[Brief Description of the Drawings]

[Drawing 1] (A) Or (E) is the cross section showing the manufacturing process of La Stampa for disks.

[Drawing 2] It is related drawing of La Stampa and immersion time amount.

[Description of Notations]

- 1 Substrate
- 2 Resist
- 3 PURIGURUBU Original Recording
- 4 Nickel Vacuum Evaporationo Film
- 5 Nickel Layer
- 6 La Stampa

---

[Translation done.]

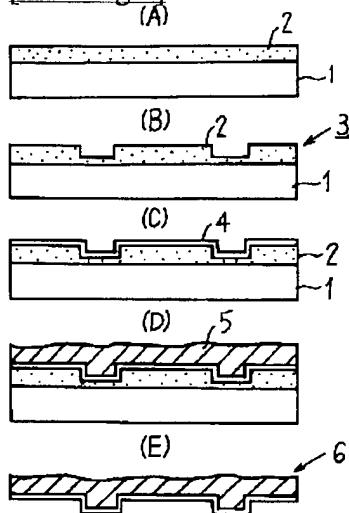
## \* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

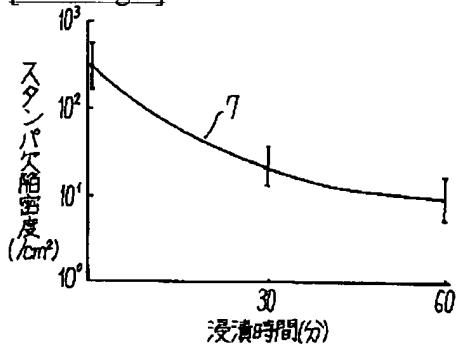
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## DRAWINGS

## [Drawing 1]



## [Drawing 2]



[Translation done.]